



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/859,482	05/18/2001	Mark Verrall	MERCK-1972 D1	5264

23599 7590 09/22/2003

MILLEN, WHITE, ZELANO & BRANIGAN, P.C.  
2200 CLARENDON BLVD.  
SUITE 1400  
ARLINGTON, VA 22201

EXAMINER

HON, SOW FUN

ART UNIT	PAPER NUMBER
----------	--------------

1772

DATE MAILED: 09/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/859,482

Applicant(s)

VERRALL ET AL.

Examiner

Sow-Fun Hon

Art Unit

1772

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 14-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-28 and 30-34 is/are rejected.
- 7) ☒ Claim(s) 29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/254,185.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Terminal Disclaimer***

1. The terminal disclaimer filed on 06/24/03 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US 6,379,758 has been reviewed and is accepted. The terminal disclaimer has been recorded.

***Allowable Subject Matter***

2. Claim 29 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Withdrawn Rejections***

3. The 112, 2<sup>nd</sup> paragraph, 102(b) and 103(a) rejections in Paper # 4 (mailed 03/20/03) have been withdrawn due to Applicant's amendments and clarifications in Paper # 5 (filed 06/24/03).

***New Rejections***

***Claim Rejections - 35 USC § 112***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The symbol "M" should be "m" in order to be consistent.

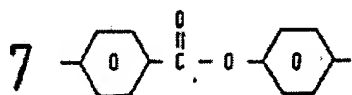
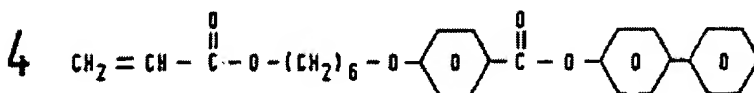
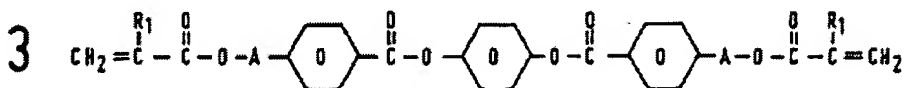
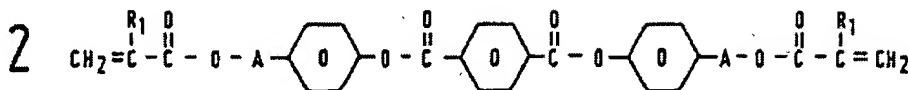
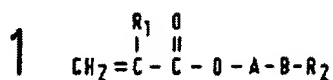
***Claim Rejections - 35 USC § 102***

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 14, 19-25, 27, 30-32, 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Broer (US 4,892,392).

Broer has a liquid crystal display which comprises a liquid crystal cell comprising an orientation layer which comprises materials 1 to 4 shown below which are oriented at a given (tilt) angle and then polymerized (column 2, lines 20-65). The orientation of the mesogenic groups is fixed so that the anisotropy (of the anisotropic polymer layer) is maintained within a wide temperature range. Less than 10 % by weight of photoinitiator is added which encompasses the range of 0.01 to 5 % by weight of Applicant (column 4, lines 20-35) and it follows that the materials make up the remainder of the composition in the weight % range of greater than 90 %. Dependent on the tilt angle of the optical axis of the mesogenic (nematic) groups, the polymer layer induces tilted orientation in the liquid crystal material (column 3, lines 1-10). Thus the anisotropic polymer exhibits a tilted structure with an optical axis having a tilt angle  $\theta$  relative to the plane of the layer greater than zero.

Art Unit: 1772



A = bivalent radical such as  $(\text{CH}_2)_x$  which is equivalent to Applicant's spacer group Sp and encompasses the range of 1 to 20 C atoms;  $n=1$ ; B = mesogenic group such as formulae 7 and 8 which is equivalent to Applicant's mesogenic group MG where r is 0, m is 0, wherein Applicant's  $\text{A}^2$  group =  $\text{A}^3$  group = 1,4-phenylene,  $\text{Z}^2$  group =  $-\text{COO}-$ ;  $\text{R}_1 = \text{H}$  or  $\text{CH}_3$  which is equivalent to Applicant's W group; and  $\text{R}_2$  = alkyl group which is equivalent to Applicant's R group and encompasses the range of up to 25 C atoms, a cyano group and a combination thereof. Applicant's P group is the  $\text{CH}_2=\text{CR}_1-\text{COO}-$  as seen in the left end of materials 1 and 2 (column 3, lines 1-30).

Since the cyano (CN) group is a polar terminal group which polarizes the electronic density of the mesogen, the examiner has taken the position that when  $\text{R}_2 = \text{CN}$  and B = formula 8, when substituted into the generic formula 1, the dielectric anisotropy of the monoreactive

Art Unit: 1772

(only left end contains the polymerizable group) mesogenic compound of Broer is greater than + 1.5.

***Claim Rejections - 35 USC § 103***

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 18, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broer.

Broer has been discussed above and teaches the anisotropic liquid crystal alignment layer comprising the polymerizable mesogenic materials which are oriented at a given (tilt) angle and then polymerized (column 2, lines 20-65). Although Broer does not specify the tilt angle, in the absence of a showing of unexpected results, it is the examiner's position that the range of tilt angle from 5 to 80 degrees is a result of routine experimentation.

10. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broer in view of Siemensmeyer et al. (US 5,833,880).

Broer has been discussed above and teaches the anisotropic liquid crystal alignment layer comprising the polymerizable mesogenic materials which are oriented at a given (tilt) angle and then polymerized, but fails to teach that the tilt angle varies throughout the layer.

Siemensmeyer et al. teaches an anisotropic polymer alignment layer (since the polymerizable liquid-crystalline materials become an anisotropic polymer once polymerized, the liquid-crystalline moieties being anisotropic), for a liquid crystal (polymer-dispersed) display which comprises a display cell. When doped with chiral compounds (can be), (column 6, lines 25-40) the polymer exhibits a tilted structure with an optical axis having a tilt angle  $\theta$  relative to

Art Unit: 1772

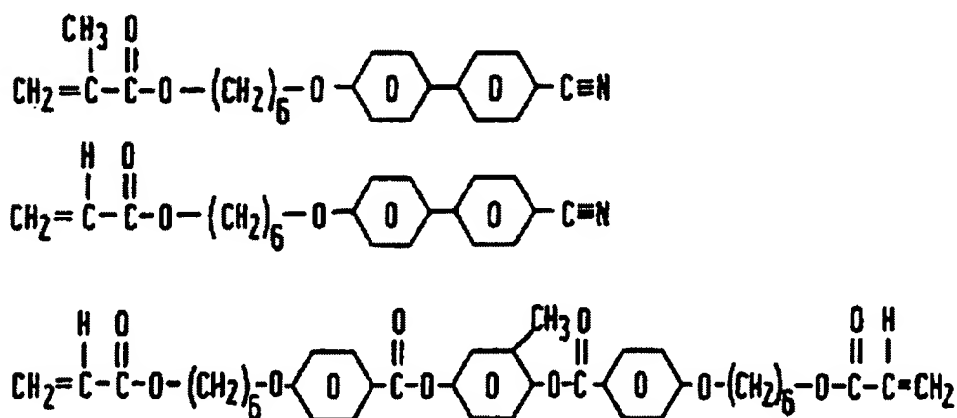
the plane of the layer which varies since the chiral dope has twisting power over the helical pitch of the anisotropic polymer (column 1, lines 15-45).

Siemensmeyer et al. teaches that this allows for different colors to be observed depending on the viewing angle (column 1, lines 15-45), thus providing the motivation to one of ordinary skill in the art to use a chiral dopant to twist the helical pitch of the polymer in the anisotropic polymer layer of Broer in order to induce a tilt angle which varies continuously in a direction normal to the layer, starting from a minimum value  $\theta_{\min}$  and ranging to a maximum value  $\theta_{\max}$  on the opposite side of the layer.

In the absence of a showing of unexpected results, it is the examiner's position that the minimum tilt angle  $\theta_{\min}$  of from 0 to 20 degrees and the maximum tilt angle  $\theta_{\max}$  of from 20 to 90 degrees are the results of routine experimentation.

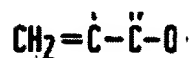
Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hikmet.

Hikmet has a layer which comprises a product formed from polymerizable mesogenic compounds (monomers) (column 1, lines 40-65) which renders the polymer layer anisotropic with examples of the structures given below:

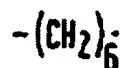


P is the polymerizable group

Art Unit: 1772



Sp is the spacer group having 1 to 20 C atoms



X is the relevant group of -O-

MG is the relevant group with

$m=0$ ,  $A^2 = 1,4$  phenylene,  $Z^2 =$  a single bond,  $A^3 = 1,4$  phenylene substituted with a cyano group

for the first two structures,

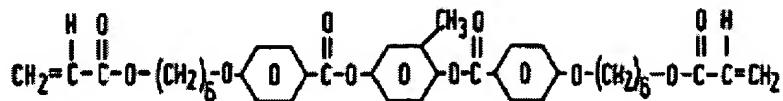
and  $m=1$ ,  $A^1 = 1,4$  phenylene,  $Z^1 = \text{COO}$ ,  $A^2 = 1,4$  phenylene substituted with  $\text{CH}_3$ ,  $Z^2 = \text{COO}$ ,

$A^3 = 1,4$  phenylene, and R is  $\text{P}-(\text{S}_p-\text{X})_n-$  for the third structure which means that it has two polymerizable groups P.

Hikmet teaches the polymerization of component a1) 30 weight % of mesogen having one polymerizable group and a liquid crystalline group and component a2) 2 weight % of mesogen having two polymerizable groups and a liquid crystalline group, in the presence of an initiator b) in the amount of 1 % (column 3, lines 45-60 and column 5, lines 1-20). *Since a1) and a2) are the only two polymerizable components, it follows that a1) comprises 93 % and a2) comprises 7 % by weight of polymerizable compounds in the composition.* The first two monoreactive mesogenic compounds (mesogen having one polymerizable group) shown above have a polar terminal group of CN (cyano), and since CN polarizes the electronic density of the mesogen, the examiner has taken the position that the two mesogens are dielectrically positive with a dielectric anisotropy of greater than + 1.5.



Art Unit: 1772



The compound above has a methyl group substituted on the second 1,4-phenylene from the left and is a homolog of the one described by Applicant with the second 1,4-phenylene being unsubstituted, having a hydrogen in place of a methyl.

Hikmet teaches that the mixture is provided with an orientation layer prior to polymerization (column 3, lines 60-70), so that the liquid crystal mesogen is oriented. In the absence of a showing of unexpected results, it is the examiner's position that a tilt angle of greater than zero orientation of the mesogen is the result of routine experimentation. Hikmet also teaches the liquid crystal display cell with transparent electrodes, and a luminaire comprising a connection for a light source and a cholesteric filter, to enable the color temperature of the emitted light to be adjusted (influenced) (column 3, lines 60-70 and column 4, lines 1-10) which read on a liquid crystal display.

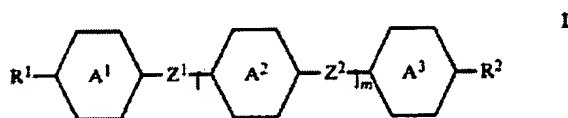
11. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Broer in view of Weber et al. (US 5,122,295).

12. Broer has been discussed above and teaches the anisotropic liquid crystal alignment layer comprising the polymerizable mesogenic materials which are oriented at a given tilt angle of greater than zero and then polymerized. Less than 10 % by weight of photoinitiator is added which encompasses the range of 0.01 to 5 % by weight of Applicant (column 4, lines 20-35) and it follows that the materials make up the remainder of the composition in the weight % range of greater than 90 %.

Art Unit: 1772

Broer teaches that the polymerizable mesogenic materials are mixed in order to lower the orientation temperature of the mesogenic groups (column 4, lines 10-20), but fails to teach the specific amounts.

Weber et al. has an anisotropic liquid crystal layer which comprises at least 10 % by weight of a liquid crystalline component comprising one or more compounds having a dielectric anisotropy of more than + 1.5, and up to 90% by weight of a liquid crystalline component comprising one or more compounds having a dielectric anisotropy of -1.5 to +1.5 (column 1, lines 1-50). Since the components with a dielectric anisotropy of greater than +1.5 ( $\Delta\epsilon$ ) have terminal CN (cyano) groups (column 3, lines 40-60), the at least 10 % by weight of a liquid crystalline compound having a dielectric anisotropy of more than + 1.5 overlaps Applicant's limitation of a1B) 5 to 40 % of at least one compound of formula I having one polymerizable group, where  $R^1$  = alkenyl is equivalent to P of Applicant, and  $R^2$  is CN which is equivalent to  $R=CN$  of Applicant. The compounds having a dielectric anisotropy of -1.5 to +1.5 are represented by the formula below:



in which

$R^1$  and  $R^2$  are each, independently of one another, n-alkyl,  $\omega$ -fluoroalkyl or n-alkenyl having up to 9 carbon atoms,

the rings  $A^1$ ,  $A^2$  and  $A^3$  are each, independently of one another, 1,4-phenylene, 2- or 3-fluoro-1,4-phenylene trans-1,4-cyclohexylene or 1,4-cyclohexenylene,

$Z^1$  and  $Z^2$  are each, independently of one another,  $-\text{CH}_2\text{CH}_2-$  or a single bond,

and

$m$  is 0, 1 or 2, and

Art Unit: 1772

Component a1A) of Applicant with 10 to 65% by weight of the at least one compound having one polymerizable group, is met by the up to 90 % by weight of the compound of formula I of Weber et al. where  $R^1$  = alkenyl is equivalent to P of Applicant, and  $R^2$  is alkyl which is equivalent to Applicant's R = alkyl; and component a2) of Applicant with 2 to 90 % by weight of at least one compound having two polymerizable groups, is met by the up to 90 % by weight of the compound of formula I of weber et al. where  $R^1 = R^2$  = alkenyl and equivalent to P of Applicant.

Weber et al. teaches that liquid crystal displays with high resistivity and low threshold voltage are obtained with the composition (column 2, lines 40-65) and thus provides the motivation to polymerize these mesogenic compounds in the specified amounts in the invention of Broer in order to obtain a liquid crystalline display with the desired electrical properties.

### *Response to Arguments*

13. Applicant's arguments with respect to claims 14-28, 30-34 have been considered but are moot in view of the new ground(s) of rejection.

### *Conclusion*

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

Art Unit: 1772

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (703)308-3265. The examiner can normally be reached Monday to Friday from 9:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on (703)308-4251. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9311.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

874  
Sow-Fun Hon

09/11/03

  
HAROLD PYON  
SUPERVISORY PATENT EXAMINER

1772

9/11/03